REMARKS/ARGUMENTS

Reconsideration of the above-identified application respectfully requested. With the present amendment, all four claims (1, 3, 17, and 32) have been amended to recite that the diffractive optical element is rotatable rather than moveable. No new matter is added by virtue of these claim amendments. Because this operation is inherent in the claimed structure, i.e., diffractive optical element carrying a holographic diffraction grating with an array of superimposed facets, this amendment should not be considered a narrowing of the claims but rather a clarification. Therefore, Applicants assert that no claims have been narrowed with the meaning of *Festo* (*Festo Corp. v. Shoketsu Kinzoku Kogyo Kabushiki Co.*, 535 US 722, 112 S.Ct. 1831, 152 L.Ed.2d 944, 62 USPQ2d 1705 (2002)). See also *Interactive Pictures Corp. v. Infinite Pictures Inc.*, 274 F.3d 1371, 61 USPQ 1152 (Fed. Cir. 2001) (addition of the words "transform calculation" was not a narrowing amendment because that addition did nothing more than make express what had been implicit in the claim as originally worded).

Claims 1, 17, and 32 stand finally rejected under 35 U.S.C. § 103 as being unpatentable over U.S. Patent No. 5,450,512 issued to Asakura, in view of U.S. Patent No. 4,337,993, issued to Kompfner, and French Patent 2,538,131 issued to Essemlali, et al.

As discussed in Applicants' previous response, the modifications proposed by the combination of Asakura, Kompfner, and Essemlali are beyond what the skilled artisan would contemplate when viewing the references teachings in their entirety. However, even if the diffractive structures of Kompfner or Essemlali were substituted for Asakura's diffractive element, the combination of references still does not disclose the invention.

The claim features relevant to the present rejection are the first and the last which recite the steps of: "providing a rotatable diffractive optical element (RDOE) having a surface carrying a holographic diffraction grating including an array of facets, each of said facets carrying a diffraction grating(s) which are superimposed, each being angularly offset with respect to each other" and "rotating said RDOE to distribute any said output optical signal(s) to any said output station(s)." See claims 1, 17, and 32.

One of the principal benefits of the present method and system is its ability to efficiently direct <u>any</u> input signals to <u>any</u> output stations, such as fibers. Claims 1, 17, and 32. Fig. 3 of the present application, and the accompanying discussion thereof, describe, for example, the distribution among four output stations. Fig. 4 shows four inputs and two outputs. Figs. 5 and 6 illustrate an arrangement of even more output stations. See also Tables I and II of the present application. The embodiment including a holographic

diffraction grating including an array of superimposed or stacked facets, which is the subject of the pending claims, is illustrated in Fig. 9 of the application. See also Page 12, lines 10-24 and page 13, lines 9 through page 14, line 10. In that embodiment, the rotatable diffractive optical element comprises a plate having a holographic diffraction grating across its top surface. Application, page 13, lines 9-11. The plate is rotated about an axis, for example, through the center of the plate. As the plate is rotated, a different facet is presented to the observer. The observer simplistically represents the output stations. Thus, in a first position, the plate will be located at a particular angle with respect to the input signal and a particular facet will be presented to the observer. When the plate is rotated to a second position, the angle of the plate with respect to the input signal changes and a different facet is presented to the observer. Each facet will include one or more diffraction gratings of predefined spacings that will direct the input signal(s) to particular output stations. See, for example, Application, page 8, line 26 through page 9, line 8 and Table II. For this system, the plate would be rotatable to eight positions and the holographic diffraction grating would include eight facets, each facet having the diffractions grating(s) necessary to achieve one of the possible eight combinations.

Neither Kompfner nor Essemlali disclose a holographic diffraction grating with facets carrying a diffraction grating(s) which are superimposed, each being angularly offset with respect to each other, such that rotation of the diffractive element permits direction of any input to any output. Kompfner discloses a volume phase grating that provides only <u>one combination</u> of inputs to outputs. See Col 1, lines 24-27, which states that the invention comprises "means for making individual optical connections each of which involves the passage of light between a specific device of one array and a specific device of the other array...". As further noted in Col. 4, lines 10-20:

> The bundles are the usual irregular arrays of fibres, and the arrangements of fibre ends in each bundle need not be known so long as there is no alteration either of the position of fibre ends within a bundle or of the relative positions of the bundle ends after the plate has been made. The plate 11a shown in Fig. 1(b) is therefore specific to the ends of the two bundles of fibers used to produce it, and is capable of coupling only those two bundle ends in those relative positions and orientations, and only when the plate itself is in one particular position and orientation relative to the bundle ends.

Thus, Kompfner's volume phase grating plate is specifically formed to provide one pre-defined signal treatment. As can be seen from the above, because the plate is specifically

formed for a particular pattern of inputs and outputs, Kompfner specifically teaches away from any movement of the plate. The elements of Kompfner's system must be fixed relative to one another. Even if it were possible to rotate Kompfner's plate, the direction of the input signals would still be confined to the pre-determined pattern. With Kompfner's device, the angles of the outputs with respect to one another are always the same. Thus, if the Kompfner device is moved, the outputs do move, but they do not move independently. Rather, they all move simultaneously, i.e., the angle between the outputs remaining the same.

On the other hand, the present system's diffractive element provides a dynamic system. Any combination of inputs and outputs at any time may be achieved simply by rotating the diffractive optical element. As noted above, one simplistic example is described in connection with Fig. 6 and Table II. For that system, if the user desires that a signal be directed output stations or fibers 1 and 3, the RDOE is rotated to position 5. To direct the input signal to outputs 1 and 2, the RDOE is rotated to position 7.

Essemlali likewise does not disclose a holographic diffraction grating having superimposed or stacked facets to direct any input to any output. Essemlali's invention includes a coherent light source that is incident on a plate having a plurality of diffraction gratings that lie linearly on the plate rather than being superimposed. (plate 6, Fig. 1). To direct signals, the plate has to be linearly moved so that the coherent light is directed to a particular output. (directional arrow at the top of Fig. 1). Once the light has been directed, a second plate including a holographic diffraction grating is used solely to focus the directed signal onto the selected output fiber. (plate 18, Fig. 1). As may be seen looking at Figs. 1 and 2, the more output fibers provided, the more diffraction gratings that must be linearly provided on the plates 6 and 18. Like Asakura, Essemlali is concerned only with distribution of a single signal to multiple outputs. Essemlali does not contemplate multiple inputs being directed to multiple outputs.

With the present invention, the facets are superimposed holographically. That means that the facets are vertically stacked one on top of another along a single axis. With Essemlali's plate, the diffractive elements lie in a horizontal plane. Comparing the present invention to the Essemlali's plate highlights the advantages realized by the present invention. With the present invention, the rotating plate can remain the same size regardless of the number of inputs and outputs. As the system becomes more complicated, more facets simply are provided on the single holographic diffraction grating. The plate then is rotated to a greater number of positions, each position corresponding to a

particular output combination. Clearly, the ability to quickly rotate from one position to another (i.e., as evidence by rise times and settling times) is essential to a switching device. The greater the size, and hence the mass, of a device, the greater will be the time needed to switch from one position to another. With the present invention, a great number of diffraction gratings may be employed without an increase in the mass or weight of the device. Rotation is easily accomplished utilizing electrostatics, a linear actuator, or a stepper motor. See application, page 13, lines 31-33.

Essemlali, by comparison, is a cumbersome device, even for a system having a single input. The more outputs involved, the greater the number of diffraction gratings and the greater the size and corresponding mass of the linearly actuated plate.

In view of the above, the combination of Asakura, Kompfner, and Essemlali does not disclose the claimed invention. The steps of "providing a rotatable diffractive optical element (RDOE) having a surface carrying a holographic diffraction grating including an array of facets, each of said facets carrying a diffraction grating(s) which are superimposed, each being angularly offset with respect to each other" and "rotating said MDOE to distribute any said output optical signal(s) to any said output station(s)" are both absent.

Claim 3 stands finally rejected under 35 U.S.C. § 103 as being unpatentable in view of Asakura, Kompfner, Essemlali, and further in view of U.S. Patent No. 5,608,278 (Mey, et al.) Claim 3, dependent on claim 1, should be considered patentable for the reasons given above.

In view of the above, Applicants respectfully request that the claims be allowed.

Respectfully submitted,

Date: 16 August 2004

Diane E. Burke

Diane E. Burke
Reg. No. 45,725
MUELLER AND SMITH, L.P.A.
Mueller-Smith Building
7700 Rivers Edge Drive
Columbus, Ohio 43235-1355
Tel.: 614-436-0600
Fax: 614-436-0057
email: dburke@muellersmith.com

CERTIFICATE OF MAILING

I hereby certify that this correspondence is being sent on August 16, 2004 to the United States Patent and Trademark Office via facsimile to the after final facsimile number for Art Unit 2872, which is 703-872-9306.

Jane Keeney

Jane Keeney